

ABSTRACT

A method and apparatus for providing precise control of magnetic coupling field in NiMn top spin valve heads and amplitude enhancement is disclosed. The magnetic coupling between free and pinned layers in NiMn top spin valve heads is
5 precisely controlled by employing the surface oxidation of Cu seed layer or/and Cu spacer layer that improve both the interfacial quality and the crystalline texture.

According to the present invention the magnitude of coupling field can be precisely controlled without affecting resistance, and the amplitude of giant magneto-resistive(GMR) heads is improved by 15% at the same coupling field without

10 affecting asymmetry performance. Thus, the present invention improves not only the interfacial roughness, but also improves the magnetic layer texture. The oxidation of Cu seed layer in the NiMn top spin valve structure provides more robust process with good control in coupling field that affects asymmetry of a GMR head.